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**Introduction.** The second cause of sensorineural hearing loss after presbycusis is Noise Induced Hearing Loss (NIHL). NIHL is the first occupational disease that is recognized by the Colombian Social Security System. A study was conducted to describe the hearing capacity of Colombian Air Force Pilots and to identify the variables that are involved in the development of NIHL. **Methods.** A total of 232 healthy Colombian Air Force pilots (227 male and 5 female) participated in the study. They completed a questionnaire and underwent physical evaluation, including audiometric testing and otolaryngologic examination. The pilots' total flight hours and type of aircraft was also recorded. Their clinical history was also reviewed along with their knowledge of occupational hearing loss programs, any symptoms as these related to NIHL, and their leisure activities. Univariate and bivariate statistical analysis was performed with SPSS software. **Results.** There was a strong correlation between NIHL and age (Mean = 31.76 yrs., S.D. = 5.68,  $p = 0.01$ ). There was a strong correlation between NIHL and attendance to discothèques (OR = 3.30, CI = 1.21-9.05). Knowledge of occupational hearing loss programs reduced the risk of hearing loss in 11% of the pilots. The most important symptoms of NIHL identified by this study were the need to repeat and increase the volume of communications, tinnitus, and misbalance. There was a strong correlation between NIHL and flight hours ( $p = 0.0001$ ). Helicopter pilots exhibited a higher proportion of NIHL. No statistically significant correlations were found relative to the use of head-phones (OR = 1.74, CI = 0.64-4.71), attendance to concerts (OR = 2.20, CI = 0.62-7.82), or motor sports (OR = 1.02, CI = 0.21-4.77). **Conclusion.** These data show that age, number of flight hours, and flight in UH-1H helicopters are strongly associated with NIHL. Further research is needed to clarify the relationship with leisure activities.

**Learning Objectives:** 1. Factors that induce hearing loss in military pilots will be discussed.

#### [416] PREVALENCE OF CARDIOVASCULAR RISK FACTORS IN CIVIL AVIATION PILOTS OF COLOMBIA 2005

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**Introduction.** Aviation safety depends on the interphase of man and airplane. As such, understanding the health of the civilian pilot population plays an important role in aviation safety. Coronary disease is the most frequent cause of sudden incapacitation in-flight. The cardiovascular risk factors associated with this disease were examined by a cross-sectional study which reviewed the medical registries of pilots certified by the civil aeronautics authority of Colombia. **Method.** A random sample was obtained from the population of Colombian pilots who were current in their medical certification between January and December of 2005. The variables extracted included: age, gender, arterial pressure, exercise regimen, use of tobacco, cholesterol and glucose levels, clothing size, flight hours, type of license, and medical history. Descriptive analysis was conducted on the resulting 614 clinical histories by means of STATA® 6 software. Statistical significance was defined by  $\alpha = 0.05$ . **Results.** The prevalence of risk factors as determined by the sample studied was: arterial hypertension 7.82%, Diabetes 1.3%, Hypercholesterolemia 36%, Hypertriglyceridemia 36%, Low High Density Lipoprotein (HDL) levels 36%, High Low Density Lipoprotein (LDL) levels 32%, Tobacco use 12.8%, Obesity 7%, and Metabolic Syndrome 6%. There was a statistically significant difference between first and second class pilots where cardiovascular risk factors were more prevalent in the latter group. In accordance with the Farmingham scale, it was calculated that 7.98% of the pilots in this study will require specific health improvement programs and close medical monitoring to modify their cardiovascular risk profile and therefore improve their safety in aviation. **Conclusions.** Understanding the health of the civilian pilot population plays an important role in aviation safety as it leads to the improvement of aeromedical education programs, health monitoring strategies, and enhanced medical certification guidelines.

**Learning Objectives:** 1. Learn the prevalence of cardiovascular risk factors in civil aviation pilots of Colombia.

Wednesday, May 14

10:30 AM

#### SLIDE: Operational Issues in Vision

#### [417] NIGHT-VISION GOGGLE VISUAL PERFORMANCE DURING 12 HOURS AT 10,000 FT ALTITUDE AT NIGHT CONDITIONS

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**Introduction:** Military un-pressurized aircraft are flown without supplemental oxygen up to 10,000 feet (3048 m). This study investigated the effects on night vision goggle (NVG) visual performance of low-grade hypoxia exposure at 10,000 ft during 12 hours night conditions. **Methods:** Hypobaric exposures in a dark environment simulating a night-operational aircraft environment were conducted in a hypobaric chamber with 29 military personnel. Each subject accomplished two 12 hour sessions; at slightly above ground level pressure and at 10,000 ft altitude. Half of the subjects participated in a 10 min moderate exercise on a bicycle ergometer every second hour. Visual performance with NVG was measured with Bailey-Lovie Visual Acuity tests, Pelli-Robinson Contrast Charts and Unaided Visual Acuity with low and high contrast charts every second hour. **Results:** Oxygen saturation (finger oximetry) significantly decreased at 10,000 ft compared to ground level, but remained stable during the 12 hours. NVG performance, for both the Bailey-Lovie and Pelli-Robson tests, improved over the 12 hours of ground level exposure, and was significantly higher than performance during the 10,000 ft altitude exposure, which remained at, or below, baseline performance over the 12 hours. Maximum differences were 4.2 chart letters and 1.7 chart letters, respectively, both occurring at the last data collection time point. No significant negative altitude effects were found for either the low or high contrast unaided mesopic vision performance. The only significant exercise effect was found for the high contrast unaided vision test, where slight improvement in acuity was seen over the 12 hours of exposure in the non-exercise group compared to a slight decrease in acuity in the exercise group (with a maximum difference of about 4 chart letters). **Conclusion:** Statistical evidence of negative effects of altitude on NVG visual performance was found. However, these effects were not considered to be of clinical significance.

**Learning Objectives:** 1. The visual performance effects found when using night vision goggle at an altitude of 10,000 ft in a dark environment are described.

#### [418] ROLL, PITCH, AND YAW OF THE HEAD AS IT TRACKS VISUAL AND AUDITORY STIMULI IN THE DARK

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**Introduction:** Pilots typically roll their heads during coordinated banking turns when the terrestrial horizon is visible. Specifically, when the aircraft rolls, from the perspective of the pilot, the terrestrial horizon appears to roll in the opposite direction. When this happens, head roll and aircraft bank angle are inversely correlated. In other words, the head seeks an approximately perpendicular orientation relative to the terrestrial horizon, although the pilot's body follows the banking aircraft's down vector, Gz. Many argue that this behavior is important for pilot (dis)orientation and head mounted displays. The head's roll is commonly attributed to an opto-kinetic cervical reflex described as a reflex evoked most strongly by stimuli in the visual periphery, providing a frame of reference that aids pilot orientation. We report an experiment testing the alternative hypothesis that head roll requires neither a reflex nor an evoking stimulus but is a stereotypic behavior resulting from neck neuromuscular biomechanics. **Methods:** A head-tracker recorded head yaw, pitch, and roll from 14 seated volunteers as each moved his/her head to follow a stimulus moving at about 10 deg/sec first horizontally then vertically to 10 terminal locations on a head-centered virtual sphere. Head tracking was assessed under four stimulus conditions: two in complete darkness; (1) a continuous white-noise sound stimulus and (2) a small light emitting diode (LED) in a restricted visual field that eliminated tracking with eye movements; and two in a fully-lighted ambient environment; (3) the LED in the restricted visual field and (4) the LED in an unrestricted visual field. **Results:** A characteristic pattern of head motion emerged that is: (a) affected by the specifics of the stimulus, and (b) different from head motion in the cockpit. **Conclusion:**